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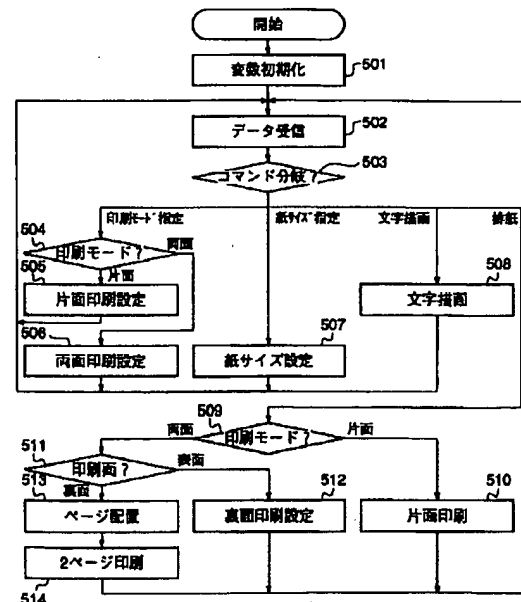
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(54) 【発明の名称】 印刷装置

(57) 【要約】

【目的】 片面印刷機構のみを装備する場合、または指定の記録紙サイズに対応できない場合であっても略2倍のサイズの記録紙に指定された画像情報を全て印刷することが可能な印刷装置を提供する。

【構成】 プリンタが両面印刷モードに設定されているか否かを判断し(ステップS504)、両面印刷モードに設定されている場合には、指定された綴じ代方向および記録紙のサイズに基づいて、記録紙両面分の画像情報を指定されたサイズの2倍のサイズの記録紙片面に印刷する際のページの展開方向、配置、および綴じ代の配置が決定され、画像情報が2倍サイズの記録紙片面に印刷される(ステップS513)。



JP-A No. 8-187913

[Title of the Invention]

PRINTING APPARATUS[Abstract]

5 [Object]

When a printing apparatus has only a single-side printing mechanism, the printing apparatus which can print the whole of specified image information on recording paper having a substantially double size
10 even if the printing apparatus is not compatible with the specified recording-paper size is provided.

[Configuration]

It is determined whether a both-sides printing mode is set in a printer (Step S504). When both-
15 sides printing mode is set in the printer in Step S504, a page expansion direction, a layout, and a binding margin arrangement in printing the image information of the both sides of the recording paper on the single side of the recording paper having the
20 size double the specified size are determined based on the specified binding direction and recording-paper size, and the image information is printed on the single side of the recording paper having the double size (Step S513).

25

[What is Claimed is]

1. A printing apparatus having both-sides

printing specifying means for specifying both-sides printing and size specifying means for specifying a size of recording paper, the printing apparatus comprising:

- 5 determining means for determining whether the printing apparatus can perform printing onto recording paper having a size substantially double a size specified by the size specifying means or not; and
- 10 control means for performing control so that surface image information and backside image information to which the both-sides printing is specified are printed on a single side of recording paper having a size substantially double the
- 15 specified size, when not only the both-sides printing specifying means specifies both-sides printing but also the determining means determines that the printing apparatus can perform printing onto recording paper having a size substantially double
- 20 the specified size.

2. A printing apparatus having both-sides printing specifying means for specifying both-sides printing, size specifying for specifying a size of recording paper, and binding margin direction

25 specifying means for specifying a binding margin direction of the recording paper, the printing

apparatus comprising:

determining means for determining whether the printing apparatus can perform printing onto recording paper having a size substantially double
5 the size specified by the size specifying means or not;

first control means for performing control so that surface image information and backside image information to which the both-sides printing is
10 specified are recorded on a single side of recording paper having a size substantially double the specified size, when not only the both-sides printing specifying means specifies both-sides printing but also the determining means determines that the
15 printing apparatus can perform printing onto the recording paper having a size substantially double the specified size; and

second control means for determining printing directions, printing positions, and binding margin
20 positions of the surface image information and the backside image information according to the binding margin direction of the recording paper specified by the binding margin direction specifying means during the single-side printing performed by the first
25 control means.

3. A printing apparatus having both-sides

printing specifying means for specifying both-sides printing and size specifying means for specifying a size of recording paper, the printing apparatus comprising:

5 determining means for determining whether the printing apparatus can perform printing onto recording paper having a size substantially double the size specified by the size specifying means or not; and

10 control means for performing control so that image information for each two pages in the image information for a plurality of continuous pages to which the both-sides printing is specified are printed on a surface and a backside of recording
15 paper having a size substantially double the specified size respectively, when not only the both-sides printing specifying means specifies both-sides printing but also the determining means determines that the printing apparatus can perform printing onto
20 recording paper having a size substantially double the specified size.

4. A printing apparatus having both-sides printing specifying means for specifying both-sides
25 printing, size specifying for specifying a size of recording paper, and binding margin direction specifying means for specifying a binding margin

direction of the recording paper, the printing apparatus comprising:

determining means for determining whether the printing apparatus can perform printing onto

5 recording paper having a size substantially double the size specified by the size specifying means or not;

first control means for performing control so that image information for each two pages in the
10 image information for a plurality of continuous pages to each of which the both-sides printing is specified are printed on a surface and a backside of recording paper having a size substantially double the specified size, when not only the both-sides printing
15 specifying means specifies both-sides printing but also the determining means determines that the printing apparatus can perform printing onto recording paper having a size substantially double the specified size; and

20 second control means for determining printing directions, printing positions, and binding margin positions of the image information of the plurality of pages according to the binding margin direction of the recording paper specified by the binding margin
25 direction specifying means during the both-sides printing performed by the first control means.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application]

The present invention relates to a printing
apparatus such as a printer which processes inputted
5 printing information to print the printing
information on recording paper.

[0002]

[Prior Art]

Conventionally, there are a printing apparatus
10 which has only a single-side printing mechanism for
printing image information on a single side of the
recording paper and a printing apparatus which is
provided with a both-sides printing mechanism for
printing the image information on both sides of the
15 recording paper. When the both-sides printing is
specified to the printing apparatus which has only
the single-side printing mechanism, the specification
is neglected, and the printing is performed onto the
single side of the recording paper.

20 [0003]

Even in the printing apparatus provided with
the both-sides printing mechanism, when the printing
apparatus is not compatible with the printing with
respect to the recording paper having the specified
25 size, only the printing apparatus displays a mismatch
error of a paper size, and the printing is not
performed.

[0004]

[Problems that the Invention is to Solve]

Accordingly, in the conventional printing apparatus which has only the single-side printing mechanism, the image information is printed only on the single side of the recording paper contrary to user's intention to print the image information on the both sides of the recording paper. Further, in the printing apparatus provided with the both-sides printing mechanism, when the printing apparatus is not compatible with the printing of the recording paper having the specified size, sometimes there is an inconvenience that the printing is not performed although the user directs the printing apparatus to perform the printing.

[0005]

In view of the foregoing, an object of the present invention is to provide a printing apparatus which can print the whole pieces of the specified image information on the recording paper having the substantially double size, when the printing machine is provided only with the single-side printing mechanism, or even if the printing apparatus is not compatible with the specified recording-paper size.

[0006]

[Means for Solving the Problems]

In order to achieve the above object, the

present invention described in claim 1 is characterized in that a printing apparatus having both-sides printing specifying means for specifying both-sides printing and size specifying means for specifying a size of recording paper, comprises:
5 determining means for determining whether the printing apparatus can perform printing onto the recording paper having the size substantially double the size specified by the size specifying means or not; and
10 control for performing control so that surface image information and backside image information to which the both-sides printing is specified are printed on a single side of the recording paper having the size substantially double the specified size, when not
15 only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the recording paper having the size substantially double the
20 specified size.

[0007]

The invention described in claim 2 is characterized in that a printing apparatus having both-sides printing specifying means for specifying
25 both-sides printing, size specifying means for specifying a size of recording paper, and binding margin direction specifying means for specifying a

binding margin direction of the recording paper,
comprises: determining means for determining whether
the printing apparatus can perform printing onto the
recording paper having the size substantially double
5 the size specified by the size specifying means or
not; first control means for performing control so
that surface image information and backside image
information to which the both-sides printing is
specified are recorded on a single side of the
10 recording paper having the size substantially double
the specified size, when not only the both-sides
printing specifying means specifies the both-sides
printing but also the determining means determines
that the printing apparatus can perform the printing
15 onto the recording paper having the size
substantially double the specified size; and second
control means for determining printing directions,
printing positions, and binding margin positions of
the surface image information and the backside image
20 information according to the binding margin direction
of the recording paper specified by the binding
margin direction specifying means during the single-
side printing performed by the first control means.

[0008]

25 The invention described in claim 3 is
characterized in that a printing apparatus having
both-sides printing specifying means for specifying

both-sides printing and size specifying means for specifying a size of recording paper, comprises: determining means for determining whether the printing apparatus can perform printing onto the recording paper having the size substantially double the size specified by the size specifying means or not; and control means for performing control so that image information for each two pages in the image information for a plurality of continuous pages to which the both-sides printing is specified are printed on a surface and a backside of the recording paper having the size substantially double the specified size, respectively, when not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the recording paper having the size substantially double the specified size.

[0009]

20 The invention described in claim 4 is characterized in that a printing apparatus having both-sides printing specifying means for specifying both-sides printing, size specifying means for specifying a size of recording paper, and binding margin direction specifying means for specifying a binding margin direction of the recording paper, comprises: determining means for determining whether

the printing apparatus can perform printing onto the recording paper having the size substantially double the size specified by the size specifying means or not; first control means for performing control so
5 that image information for each two pages in the image information for a plurality of continuous pages to which the both-sides printing is specified are printed on a surface and a backside of the recording paper having the size substantially double the
10 specified size, when not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the recording paper having the size substantially double
15 the specified size; and second control means for determining printing directions, printing positions, and binding margin positions of the image information of the plurality of pages according to the binding margin direction of the recording paper specified by
20 the binding margin direction specifying means during the both-sides printing performed by the first control means.

[0010]

[Operation]

25 According to the printing apparatus described in claim 1, the determining means determines whether the printing apparatus can perform the printing onto

the recording paper having the size substantially double the size specified by the size specifying means or not. When not only the both-sides printing specifying means specifies the both-sides printing
5 but also the determining means determines that the printing apparatus can perform the printing onto the recording paper having the size substantially double the size specified by the size specifying means, the control means performs the control so that the
10 surface image information and the backside image information to which the both-sides printing is specified are printed on the single side of the recording paper having the size substantially double the specified size.

15 [0011]

According to the printing apparatus described in claim 2, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially
20 double the size specified by the size specifying means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the
25 recording paper having the size substantially double the size specified by the size specifying means, the first control means performs the control so that the

surface image information and the backside image
information to which the both-sides printing is
specified are printed on a single side of the
recording paper having the size substantially double
5 the specified size, and the second control means
determines the printing directions, the printing
positions, and the binding margin positions of the
surface image information and the backside image
information according to the binding margin direction
10 of the recording paper specified by the binding
margin direction specifying means during the single-
side printing performed by the first control means.
[0012]

According to the printing apparatus described
15 in claim 3, the determining means determines whether
the printing apparatus can perform the printing onto
the recording paper having the size substantially
double the size specified by the size specifying
means or not. When not only the both-sides printing
20 specifying means specifies the both-sides printing
but also the determining means determines that the
printing apparatus can perform the printing onto the
recording paper having the size substantially double
the size specified by the size specifying means, the
25 control means performs the control so that the image
information for each two pages in the image
information for the plural a plurality of continuous

pages to which the both-sides printing is specified are printed on the surface and the backside of the recording paper having the size substantially double the specified size, respectively.

5 [0013]

According to the printing apparatus described in claim 4, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially
10 double the size specified by the size specifying means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the
15 recording paper having the size substantially double the size specified by the size specifying means, the first control means performs the control so that the image information for each two pages in the image information for the plurality of continuous pages to
20 which the both-sides printing is specified are printed on the surface and the backside of the recording paper having the size substantially double the specified size, the second control means determines the printing directions, the printing
25 positions, and the binding margin positions of the image information of the plurality of pages according to the binding margin direction of the recording

paper specified by the binding margin direction specifying means during the both-sides printing performed by the first control means.

[0014]

5 [Embodiment]

Referring now to the drawings, embodiments of the present invention will be described below.

[0015]

Fig. 1 is a sectional view showing a schematic
10 configuration of LBP (Laser Beam Printer) 1000 constituting a printing apparatus according to a first embodiment of the present invention. LBP 1000 is a laser printer which has only a single-side printing mechanism, i.e. LBP 1000 is not provided
15 with a both-sides printing mechanism with which the printing is automatically performed to both sides of the recording paper. Based on printing information (character code and the like), form information, a macro command, or the like which is provided from an
20 externally connected host computer, LBP 1000 produces image information such as the corresponding character pattern and form pattern to record the image on the recording paper which is of a recording medium.

[0016]

25 Each constituent of LBP 1000 will be described below. In Fig. 1, the numeral 1015 designates an operation panel which includes switches for inputting

various pieces of operation information and display means such as LED (Light Emitting Diode). The numeral 1001 designates a printer control unit which controls the whole of LBP 1000. The printer control
5 unit 1001 analyzes the printing information (character code and the like), the form information, the macro command, or the like which is provided from the host computer. Further, the printer control unit 1001 converts the printing information, the form
10 information, the macro command, or the like, into a video signal of the corresponding character pattern, form pattern, or the like to output the video signal to a laser driver 1002.

[0017]

15 The laser driver 1002 is a drive circuit which drives a semiconductor laser 1003. The laser driver 1002 controls on-and-off-switching of a laser beam 1004, which is emitted from the semiconductor laser 1003, based on the video signal inputted from the
20 printer control unit 1001.

[0018]

The laser beam 1004 emitted from the semiconductor laser 1003 is deflected in a horizontal direction by a rotating polygon mirror 1005 to
25 perform scanning exposure on an electrostatic drum 1006. Therefore, an electrostatic latent image such as the character pattern and the form pattern is

formed on the electrostatic drum 1006. The electrostatic latent image is developed by a development unit 1007 provided around the electrostatic drum 1006, and the developed image is
5 transferred to the recording paper.

[0019]

Cut sheets used as recording papers are stored in a paper cassette 1008. The cut sheet is taken into the apparatus from the paper cassette 1008
10 through a paper-feed roller 1009, a pair of first conveying rollers 1010, and a pair of second conveying rollers 1011, and then the cut sheet is supplied to the electrostatic drum 1006.

[0020]

15 After the recording paper is developed and transferred by the electrostatic drum 1006 and the development unit 1007, the recording paper is fixed by a fixing device 1012, and the recording paper is conveyed to a paper-discharge unit by a third
20 conveying roller 1013, a fourth conveying roller 1014, and the like. Then, the recording paper is discharged onto a paper-discharge tray.

[0021]

Fig. 2 is a block diagram showing a schematic
25 configuration of a control system of the apparatus according to the embodiment. The control system mainly includes the printer control unit 1001 and a

host computer 11 connected to the printer control unit 1001 through a predetermined interface 21.

[0022]

The printer control unit 1001 includes a
5 printer CPU 12, RAM 19, ROM 13, a system bus 15, an
input unit 18, a printing unit interface (I/F) 16, a
memory controller (MC) 20, and the like. These
constituents are connected to one another through the
system bus 15. The operation unit 1015 is connected
10 to the system bus 15, a printing unit 17 is connected
to the printing unit interface 16, and an external
memory 14 is connected to the memory controller 20.
The predetermined interface 21 is connected to the
input unit 18, and the host computer 11 is connected
15 to the printer control unit 1001 through the
interface 21. The host computer 11 transmits data
such as the pattern, the character, and the image to
the printer control unit 1001 in a form of a printer
language.

20 [0023]

The printer CPU 12 totally controls access from
the host computer 11 to various devices connected to
the system bus 15 based on a control program stored
in a program ROM 13b in ROM 13, the external memory
25 14, or the like. The printer CPU 12 also controls
output of the image information to the printing unit
(printer engine) 17 through the printing unit

interface 16. Further, the printer CPU 12 can conduct communication with the host computer 11 through the input unit 18.

[0024]

5 The printing unit 17 records the image information inputted through the printing unit interface 16 on the recording paper.

[0025]

Font data which is used in generating the
10 output image information and the like are stored in a font ROM 13a in the ROM 13. Information utilized in the host computer 11 and the like are stored in data ROM 13c.

[0026]

15 RAM 19 functions as a main memory or a work area of CPU 12 and the like, and RAM 19 is used as a buffering area of input data, an expansion area of imaging information, and a storage area of environmental data. RAM 19 is configured to be able
20 to extend a storage capacity by an optional RAM connected to an expanded port not shown.

[0027]

The external memory 14 is the memory which is connected as an option formed by a hard disk drive
25 (HD), an extension ROM, a flash PROM, or the like. The memory controller 20 controls the access of the external memory 14. The font data, an emulation

program, the form data, and the like are stored in the external memory 14. The external memory 14 is not limited to one system. It is possible that the printer control unit is configured to be connected to a plurality of external memories in which optional fonts in addition to the build-in fonts, a program for interpreting different printer control languages, and the like. Further, it is also possible to have NVRAM not shown to store printer mode setting information from the operation panel 1015.

[0028]

Referring to Figs. 3 to 6, the operations of the apparatus of the embodiment will be described.

[0029]

Fig. 3 is a flowchart showing a flow of a printing process controlled by the host computer 11 and the printer control unit 1001.

[0030]

In Step S501, when the power is turned on, various variables set on RAM 19 are initialized. For example, a printing mode flag to indicate a printing mode is set to single-side printing specification, a paper-size flag is set to A4 specification, a binding margin direction flag to indicate the binding direction of the recording paper is set to left side specification, a binding margin length is set to a value of zero, and a printing surface flag to

indicate a recording surface of the recording paper is set to surface (a first surface) specification.
[0031]

Then, in Step S502, the input unit 18 receives
5 the data from the host computer 11 to read the data of one unit code. In Step S503, it is determined which the inputted data is a printing mode specification command, a paper-size specification command, a paper-discharge command, or the printing
10 information such as a character code. When it is determined that the data is the printing mode specification command, the flow goes to Step S504, and it is determined whether the specified printing mode is a single-side printing mode or a both-sides
15 printing mode. In addition to the printing mode to indicate the single-side printing mode or the both-sides printing mode, the printing mode specification command specifies a binding direction of the recording paper during the both-sides printing and a
20 setting value (unit is millimeter) of the binding margin length. The recording-paper binding direction specified by the printing mode specification command includes a left binding margin direction, a right binding margin direction, an upper binding margin
25 direction, a lower binding margin direction.
[0032]

In Step S504, when it is determined that the

specified mode is the single-side printing mode, the flow goes to Step S505. In Step S505, the printing mode flag is set to the single-side specification, the printing surface flag is set to the surface
5 specification, and the flow returns to Step S502.
[0033]

In Step S504, when it is determined that the specified mode is the single-side printing mode, the flow goes to Step S506. In Step S506, the printing
10 mode flag is set to the both-sides specification, the binding direction flag and the binding margin length are set to the specified direction and value, respectively, and the flow returns to Step S502.
[0034]

15 In Step S503, when it is determined that the inputted data is the paper-size specification command, the flow goes to Step S507. In Step S507, the size specified by the paper-size specification command is set to the paper-size flag, and the flow returns to
20 Step S502. In the embodiment, various sizes of A4, A4R, B5, B5R, A5, and A5R can be set in the paper-size flag.
[0035]

In Step S503, when it is determined that the
25 inputted data is the character code, the flow goes to Step S508. In Step S508, the character pattern corresponding to the inputted character code is read

out from the font ROM 13a and expanded in the imaging memory provided on RAM 19, and the flow returns to Step S502.

[0036]

5 In Step S503, when it is determined that the inputted data is the paper-discharge command, the flow goes to Step S509. In Step S509, the printing mode flag is checked both-sides. When the printing mode flag is the single-side printing mode, the flow
10 goes to Step S510. In Step S510, the character pattern stored in the imaging memory is transmitted, without modification, to the printing unit 17 through the printing unit interface 16, and the character pattern is recorded on the recording paper specified
15 by the paper-size flag. On the other hand, in Step S509, when the printing mode flag is the both-sides printing mode, the flow goes to Step S511. In Step S511, the printing surface flag is checked. When the printing surface flag is set to the surface, the
20 specification of the printing surface flag is changed to the backside, the new imaging memory is obtained on RAM 19 while previous storage contents of the imaging memory are saved, and the flow returns to Step S502.

25 [0037]

In Step S511, when the printing surface flag is set to the backside, the flow goes to Step S513. In

Step S513, the paper-size flag and the binding margin direction flag are checked, the paper size, a page expansion direction, a layout, and a binding margin arrangement of the recording paper on which the image information is recorded are determined, and the flow goes to Step S514. In Step S514, the image information on the surface and the image information on the backside which are stored in the imaging memory are transferred to the printing unit 17 through the printing unit interface 16 to perform the printing according to the paper size, the page expansion direction, the layout, and the binding margin arrangement which are determined in Step S513. The printing surface flag is returned to the surface, and the flow returns to Step S502.

[0038]

Figs. 4 and 5 are a view showing a relationship between the paper size and binding margin direction of the recording paper, which are specified by the printing mode specification command, and the paper size, page expansion direction, layout, and binding margin arrangement of the recording paper, on which the image information is actually recorded.

[0039]

Fig. 4 shows conditions in which the left and right sides or the upper and lower sides of the recording paper are set in the same printing

direction while the binding margin positions are provided in the left and right ends or the upper and lower ends. For example, in Fig. 4A, when the printing is performed to the both surfaces of the A5 size recording paper while the binding margin direction is set to the left side binding, the image information for the surface in the image information which should be printed on the both surfaces is recorded on the left side of a fold line in the center of one surface of the A4R recording paper which is double the A5 size, and the image information which should be printed on the backside is recorded on the right side of the A4R recording paper in the same direction as the surface, and the binding margins are provided in the left and right ends of the recording paper. In the case where the specified recording-paper size is B5 or A4, Fig. 4 shows that the printing is similarly performed on the B4R or A3R recording paper double the B5 size or the A4 size, respectively.

[0040]

Fig. 5 shows the conditions in which the left and right sides or the upper and lower sides of the recording paper are set in the reverse printing direction while the binding margin position is provided only in one end of the left and right ends or the upper and lower ends. For example, in Fig. 5A,

when the printing is performed to the both sides of
the A5 size recording paper while the binding margin
direction is set to the upper side binding, the image
information for the surface in the image information
5 which should be printed on the both surfaces is
recorded on the left side of the fold line in the
center of one surface of the A4R recording paper, and
the image information should be printed on the
backside is recorded on the right side of the A4R
10 size recording paper in the opposite direction from
the left side, and the binding margin is provided in
the upper end of the recording paper. In the case
where the specified recording-paper size is B5 or A4,
Fig. 5 shows that the printing is similarly performed
15 on the B4R or A3R recording paper, respectively.

[0041]

Thus, according to the printing apparatus of
the embodiment, in the case where the both-sides
printing command is issued to the printer which is
20 not compatible with the both-sides printing, the
paper size, the page expansion direction, the layout,
and the arrangement of the binding margin are
determined based on the size of the specified
recording paper and the binding margin direction when
25 the printer can perform printing to the double size
recording paper, and the image information which
should be printed on the both sides of one sheet of

recording paper is printed on the single side of the double size recording paper. Therefore, the printing can be performed while flexibly meeting user's intention.

5 [0042]

The process in which the host computer 11 directs the printer such as LBP 1000 which is not provided with the both-sides printing mechanism to perform the both-sides printing is described in the
10 embodiment. However, the present invention is not limited to this embodiment. Even in the printer provided with the both-sides printing mechanism, it is also possible that the printer is configured to be able to perform the setting so that the image
15 information which should be printed on the both sides of the specified-size recording paper is recorded on the single side of the recording paper having the area substantially double the specified size.

[0043]

20 In the embodiment, the standard A4 size, B5 size, and the like are used as the paper size. However, the present invention is not limited to this embodiment. Needless to say, the present invention can also be applied to the nonstandard recording
25 paper.

[0044]

Next, referring to the drawings, a second

embodiment of the present invention will be described.

[0045]

Fig. 6 is a sectional view showing a schematic configuration of LBP 3000 constituting a printing apparatus according to the second embodiment of the present invention. LBP 3000 is the laser beam printer which can perform the both-sides printing. Based on the printing information (character code and the like), the form information, the macro command, or the like which is provided from the externally connected host computer, LBP 3000 produces the image information such as the corresponding character pattern and form pattern to record the image information on the recording paper which is of the recording medium.

[0046]

Each constituent of LBP 3000 will be described below. In Fig. 6, the numeral 3026 designates an operation panel which includes the switches for inputting various pieces of operation information and the display means such as LED (Light Emitting Diode). The numeral 3001 designates a printer control unit which controls the whole of LBP 3000. The printer control unit 3001 produces the video signal of the corresponding character pattern, or the like, based on the printing information (character code and the like), the form information, the macro command, or

the like which is provided from the host computer,
and the printer control unit 3001 outputs the video
signal to a laser driver 3002. When LBP 3000
performs the both-sides printing, first, the printer
5 control unit 3001 outputs the video signal produced
based on the printing information for the backside (a
second surface) in the printing information for the
both sides of the recording paper, which is provided
from the host computer. Next, the printer control
10 unit 3001 outputs the video signal of the surface (a
first surface) to the laser driver 3002.

[0047]

The laser driver 3002 is a drive circuit which
drives a semiconductor laser 3003. The laser driver
15 3002 controls the on-and-off-switching of a laser
beam 3004, which is emitted from the semiconductor
laser 3003, based on the video signal inputted from
the printer control unit 3001.

[0048]

20 The laser beam 3004 emitted from the
semiconductor laser 3003 is deflected in a horizontal
direction by a rotating polygon mirror 3005 to
perform scanning exposure on an electrostatic drum
3006. Therefore, the electrostatic latent image such
25 as the character pattern and the form pattern is
formed on the electrostatic drum 3006. The
electrostatic latent image is developed by a

development unit 3007 provided around the electrostatic drum 3006, and the developed image is transferred to the recording paper.

[0049]

5 Cut sheets used as the recording paper are stored in a paper cassette 3008. The cut sheet is taken into the apparatus from the paper cassette 3008 through a paper-feed roller 3009, a pair of first conveying rollers 3010, and a pair of second
10 conveying rollers 3011, and then the cut sheet is supplied to the electrostatic drum 3006.

[0050]

 The recording paper on which the development and transfer are performed to the backside by the
15 electrostatic drum 3006 and the development unit 3007 is conveyed to a fixing device 3015 through a third conveying roller 3012, a fourth conveying rollers 3013, and a pair of fifth conveying rollers 3014. The backside of the recording paper is fixed by the
20 fixing device 3015. Subsequently, the recording paper is conveyed to a pair of seventh conveying rollers 3019 through a first switching device 3017 and a pair of sixth conveying roller 3018, and the recording paper is temporarily held in the pair of
25 seventh conveying rollers 3019 in order to perform switchback.

[0051]

The recording paper for which the switchback is performed by the pair of seventh conveying rollers 3019 is conveyed to the electrostatic drum 3006 and the development unit 3007 through a second switching
5 device 3020, a pair of eighth conveying rollers 3021, and the pair of second conveying rollers 3011. The development and the transfer are performed to the surface of the recording paper, and the recording paper is conveyed to the fixing device 3015 through
10 the third conveying roller 3012, the fourth conveying roller 3013, and the pair of fifth conveying rollers 3014. The surface of the recording paper is fixed by the fixing device 3015, and the recording paper is discharged onto the paper-discharge tray through a
15 third switching device 3022, an ninth conveying roller 3023, a tenth conveying roller 3024, and a pair of eleventh conveying rollers 3025.

[0052]

Fig. 7 is a block diagram showing the schematic
20 configuration of the control system of the printing apparatus according to the embodiment. Because the control system of the embodiment is the same as the control system of the first embodiment, the description of the control system is neglected.

25 [0053]

Subsequently, referring to Figs. 8 to 12, the operation of the apparatus of the embodiment will be

described.

[0054]

Fig. 8 is a flowchart showing the flow of the printing process controlled by the host computer 11 and the printer control unit 1001. In Fig. 8, because Step S901 to Step S909 are similar to Step S501 to Step S509 shown in Fig. 3, the description is neglected.

[0055]

10 In Step S909, when it is determined that the printing mode set in the printing mode specification flag is the single-side mode, the flow goes to Step S910. In Step S910, it is determined whether the printing can be performed on the recording paper
15 having the specified size or not, and it is determined whether the printing can be performed on the recording paper having the size double the specified size or not. When the printing can be performed on the recording paper having the specified
20 size, the flow goes to Step S911. In Step S911, the storage contents of the imaging memory are transferred, without modification, to the printing unit 17 through the printing unit interface 16, and the storage contents are recorded on the recording
25 paper.

[0056]

In Step S910, when it is determined that the

printing can be performed only on the recording paper having the size double the specified size, the flow goes to Step S912. In Step S912, the printing surface flag is checked. In the apparatus of the embodiment, a first page through a fourth page to each of which the printing is specified can be set in the printing surface flag. In Step S912, when the printing surface flag is set in the first page, the flow goes to Step S913. In Step S913, the new imaging memory is obtained while the recording contents of the imaging memory set on RAM 19 is saved, the printing surface flag is changed to the second page, and the flow returns to Step S902.

[0057]

15 In Step S912, when the printing surface flag is set in the second page, the flow goes to Step S914. In Step S914, the paper-size flag and the binding margin flag are checked to determine the paper size, the page expansion direction, the layout, and the binding margin arrangement of the recording paper on which the image information is recorded according to the examples shown in Figs. 4 and 5.

[0058]

25 In Step S915, the first-page (surface) image information and the second-page (backside) image information which are saved in the individual imaging memory are transferred to the printing unit 17

through the printing unit interface 16 to perform the printing according to the paper size, the page expansion direction, the layout, and the binding margin arrangement of the recording paper, which are
5 determined in Step S914. Further, in Step S915, the printing surface flag is returned to the first page, and the flow returns to Step S902.

[0059]

In Step S909, when it is determined that the
10 printing mode is the both-sides printing mode, the flow goes to Step S916. In Step S916, the printing surface flag is checked e . When the printing surface flag is set in the first page or the third page, the flow goes to Step S917. In Step S917, the
15 printing surface flag is incremented by one page (When the printing surface flag is set in the first page, the printing surface flag will be set in the second page. When the printing surface flag is set in the third page, the printing surface flag will be
20 set in the fourth page.), the new imaging memory is obtained while the imaging memory in which the image information of the printing surface is stored is saved, and the flow returns to Step S902.

[0060]

25 In Step S916, when it is determined that the printing surface is the second page, the flow goes to Step S918. In Step S918, it is determined whether

the printing can be performed on the recording paper having the specified size or not, and it is determined whether the printing can be performed on the recording paper having the size double the
5 specified size or not. When the printing can be performed on the recording paper having the specified size, the flow goes to Step S919. In Step S919, the storage contents of the first page and second page imaging memories and the specified binding margin
10 direction are transferred to the printing unit 17 through the printing unit interface 16, and the binding margin corresponding to the specified binding margin direction is provided on the recording paper having the specified size to perform the both-sides
15 printing. Further, in Step S919, the printing surface flag is returned to the first page, and the flow returned to Step S902.

[0061]

In Step S918, when it is determined that the
20 printing can be performed only on the recording paper having the size double the specified size, the flow goes to Step S920. In Step S920, the imaging memory is saved to obtain the new imaging memory, the printing surface flag is set in the third page, and
25 the flow returns to Step S902.

[0062]

In Step S916, when it is determined that the

printing surface is the fourth page, the paper-size flag and the binding margin flag are checked to determine the paper size, the page expansion direction, the layout, and the binding margin arrangement of the recording paper on which the image information is recorded. Then, the flow goes to Step S921. In Step S921, the first-page image information to the fourth-page image information which are saved in the imaging memories are transferred to the printing unit 17 through the printing unit interface 16 to perform the printing on the both sides of the recording paper according to the paper size, the page expansion direction, the layout, and the binding margin arrangement of the recording paper, which are determined in Step S916. Further, in Step S921, the printing surface flag is returned to the first page, and the flow returns to Step S902.

[0063]

Figs. 9 to 12 are a view showing a relationship between the paper size and binding margin direction of the recording paper, which are specified by the printing mode specification command, and the paper size, page expansion direction, layout, and binding margin arrangement of the recording paper, on which the image information is actually recorded.

[0064]

Fig. 9 shows the conditions in which the left

and right sides of the recording paper are set in the same printing direction, and the surface and the backside of the recording paper are set in the same printing direction, while the binding margin positions are provided in the left and right ends. For example, in Fig. 9A, when the printing is performed to the both surfaces of the A5 size recording paper while the binding margin direction is set to the left side binding, the first-page image information is recorded on the left side of a tear-off line in the center of the A4R recording-paper surface, the fourth-page image information is recorded on the right side of the tear-off line while orientated in the same direction as the left side, the third-page image information is recorded on the left side of the tear-off line of the recording-paper backside while orientated in the same direction as the surface, and the second-page image information is recorded on the right side of the tear-off line while orientated in the same direction as the surface. In the case where the specified recording-paper size is B5 or A4, Fig. 9 shows that the printing is performed on the B4R or A3R recording paper.

[0065]

Fig. 10 shows the conditions in which the binding margin positions are provided in the upper and lower ends, the upper and lower sides of the

recording paper are set in the same printing direction, and the printing direction of the recording-paper surface is opposed to the printing direction of the recording-paper backside. For example, in Fig. 10A, when the printing is performed to the both surfaces of the A5 size recording paper while the binding margin direction is set to the upper side binding, the first-page image information is recorded on the upper side of the tear-off line in the center of the A4 recording-paper surface, the fourth-page image information is recorded on the lower side of the tear-off line while orientated in the same direction as the upper side, the second-page image information is recorded on the upper side of the tear-off line of the recording-paper backside while orientated in the opposite direction to the surface, and the third-page image information is recorded on the lower side of the tear-off line while orientated in the opposite direction to the surface. In the case where the specified recording-paper size is B5R or A4R, Fig. 10 shows that the printing is performed on the B4 or A3 recording paper.

[0066]

Fig. 11 shows the conditions in which the binding margin position is provided in one end in the vertical direction, the printing directions on the left and right sides are set opposite to each other,

and the printing direction of the recording-paper surface is same as the printing direction of the recording-paper backside. For example, in Fig. 11A, when the printing is performed to the both surfaces
5 of the A5 size recording paper while the binding margin direction is set to the upper side binding, the first-page image information is recorded on the left side of the tear-off line in the center of the A4R recording-paper surface, the fourth-page image
10 information is recorded on the right side of the tear-off line while orientated in the opposite direction to the left side, the third-page image information is recorded on the left side of the tear-off line of the recording-paper backside while
15 orientated in the same direction as the surface, and the second-page image information is recorded on the right side of the tear-off line while orientated in the same direction as the surface. In the case where the specified recording-paper size is B5 or A4, Fig.
20 11 shows that the printing is performed on the B4R or A3R recording paper.

[0067]

Fig. 12 shows the conditions in which the binding margin position is provided in one end in the
25 horizontal direction, the printing directions on the upper and lower sides are set opposite to each other, and the printing direction of the recording-paper

surface is same as the printing direction of the recording-paper backside. For example, in Fig. 12A, when the printing is performed to the both surfaces of the A5R size recording paper while the binding margin direction is set to the upper side binding, the forth-page image information is recorded on the upper side of the fold line in the center of the A4 recording-paper surface, the first-page image information is recorded on the lower side of the fold line while orientated in the opposite direction to the upper side, the third-page image information is recorded on the upper side of the fold line of the recording-paper backside while orientated in the same direction to the surface, and the second-page image information is recorded on the lower side of the fold line while orientated in the same direction as the surface. In the case where the specified recording-paper size is B5R or A4R, Fig. 12 shows that the printing is performed on the B4 or A3 recording paper.

20 [0068]

Fig. 13 shows the conditions in which the binding margin position is provided in the central portion of the recording paper, the printing direction on the left side is same as the printing direction on the right side, and the printing direction of the recording-paper surface is same as the printing direction of the recording-paper

backside. For example, in Fig. 13A, when the printing is performed to the both surfaces of the A5 size recording paper while the binding margin direction is set to the left side binding, the
5 fourth-page image information is recorded on the left side of the fold line in the center of the A4R recording-paper surface, the first-page image information is recorded on the right side of the fold line while orientated in the same direction as the
10 left side, the second-page image information is recorded on the left side of the fold line of the recording-paper backside while orientated in the same direction as the surface, and the third-page image information is recorded on the right side of the fold
15 line while orientated in the same direction as the surface. In the case where the specified recording-paper size is B5 or A4, Fig. 13 shows that the printing is performed on the B4R or A3R recording paper.

20 [0069]

Fig. 14 shows the conditions in which the binding margin position is provided in the central portion of the recording paper, the printing direction on the upper side is same as the printing
25 direction on the lower side, and the printing direction of the recording-paper surface is opposite to the printing direction of the recording-paper

backside. For example, in Fig. 14A, when the printing is performed to the both surfaces of the A5R size recording paper while the binding margin direction is set to the upper side binding, the fourth-page image information is recorded on the upper side of the fold line in the center of the A4 recording-paper surface, the first-page image information is recorded on the lower side of the fold line while orientated in the same direction as the upper side, the third-page image information is recorded on the upper side of the fold line of the recording-paper backside while orientated in the opposite direction to the surface, and the second-page image information is recorded on the lower side of the fold line while orientated in the opposite direction to the surface. In the case where the specified recording-paper size is B5R or A4R, Fig. 14 shows that the printing is performed on the B4 or A3 recording paper.

[0070]

As described above, according to the printing apparatus of the second embodiment, in the case where the printing apparatus is directed to perform the printing onto the recording paper having the size with which the printing apparatus is not compatible, when the printer can perform the printing to the double size recording paper, the page expansion

direction, the layout, and binding margin arrangement are determined based on the specified recording-paper size and binding direction, and the image information which should be printed on the both sides of the two
5 sheets of recording paper is printed on the both sides of one sheet of recording paper having the double size. Therefore, the printing can be performed while further flexibly meeting the user's intention.

10 [0071]

In the embodiment, the printing is performed to the both sides of the recording paper having the double size only when the both-sides printing cannot be performed to the specified recording paper.

15 However, the present invention is not limited to the embodiment. Even if the both-sides printing can be performed to the specified recording paper, it is also possible that the printing apparatus is configured to perform the printing to the both sides
20 of the double size recording paper by the setting.

[0072]

In the embodiment, the standard A4 size, B5 size, and the like are used as the paper sizes. However, the present invention is not limited to the
25 second embodiment. Needless to say, the present invention can also be applied to the nonstandard recording paper.

[0073]

In the second embodiment, the method of performing the printing to the both sides of the double size recording paper is described as the so-called dual page print in which the tear-off line is set in the center of the recording paper. However, instead of the methods shown in Figs. 9 and 10, it is also possible to adopt the printing method in which the fold line is set in the center of the recording paper as shown in Figs. 13 and 14.

[0074]

In each of the above described embodiments, the present invention is applied to the laser beam printer. However, needless to say, the present invention can be applied to the printers adopting other printing methods.

[0075]

[Effect of the Invention]

As described above, according to the printing apparatus described in claim 1, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially double the size specified by the size specifying means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform

the printing onto the recording paper having the size substantially double the size specified by the size specifying means, the control means performs the control so that the surface image information and the
5 backside image information to which the both-sides printing is specified are printed on the single side of the recording paper having the size substantially double the specified size. Therefore, even in the case where the printing apparatus is provided only
10 with the single-side printing mechanism, or even if the printing apparatus is not compatible with the specified recording-paper size, the whole pieces of specified image information can be printed on the recording paper having the substantially double size.

15 [0076]

According to the printing apparatus described in claim 2, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially
20 double the size specified by the size specifying means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the
25 recording paper having the size substantially double the size specified, the first control means performs the control so that the surface image information and

the backside image information to which the both-sides printing is specified are recorded on a single side of the recording paper having the size substantially double the specified size, and the

5 second control means determines the printing directions, the printing positions, and the binding margin positions of the surface image information and the backside image information according to the binding margin direction of the recording paper

10 specified by the binding margin direction specifying means during the single-side printing performed by the first control means. Therefore, even in the case where the printing apparatus is provided only with the single-side printing mechanism, or even if the

15 printing apparatus is not compatible with the specified recording-paper size, the whole pieces of specified image information can be printed on the recording paper having the substantially double size.

[0077]

20 According to the printing apparatus described in claim 3, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially double the size specified by the size specifying

25 means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the

printing apparatus can perform the printing onto the recording paper having the size substantially double the size specified, the control means performs the control so that the image information for each two
5 pages in the image information for a plurality of continuous pages to which the both-sides printing is specified are printed on the surface and the backside of the recording paper having the size substantially double the specified size, respectively. Therefore,
10 even if the printing apparatus is not compatible with the specified recording-paper size, the whole pieces of specified image information can be printed on the recording paper having the substantially double size.
[0078]

15 According to the printing apparatus described in claim 4, the determining means determines whether the printing apparatus can perform the printing onto the recording paper having the size substantially double the size specified by the size specifying
20 means or not. When not only the both-sides printing specifying means specifies the both-sides printing but also the determining means determines that the printing apparatus can perform the printing onto the recording paper having the size substantially double
25 the size specified, the first control means performs the control so that the image information for each two pages in the image information for a plurality of

continuous pages to which the both-sides printing is specified are printed on the surface and the backside of the recording paper having the size substantially double the specified size, the second control means
5 determines the printing directions, the printing positions, and the binding margin positions of the image information for a plurality of pages according to the binding margin direction of the recording paper specified by the binding margin direction
10 specifying means during the both-sides printing performed by the first control means. Therefore, even if the printing apparatus is not compatible with the specified recording-paper size, the whole pieces of specified image information can be printed on the
15 recording paper having the substantially double size.
[Brief Description of the Drawings]

Fig. 1 is a sectional view showing a schematic configuration of a printing apparatus according to an embodiment of the present invention;

20 Fig. 2 is a block diagram showing a schematic configuration of a control system of the printing apparatus;

Fig. 3 is a flowchart showing a control flow performed by the control system;

25 Fig. 4 is a view showing a relationship between the specified paper size and binding margin direction and the recorded paper size, imaging position, and

binding margin setting position;

Fig. 5 is a view showing a relationship between the specified paper size and binding margin direction and the recorded paper size, imaging position, and
5 binding margin setting position;

Fig. 6 is a sectional view showing a schematic configuration of a printing apparatus according to an embodiment of the present invention;

Fig. 7 is a block diagram showing a schematic
10 configuration of a control system of the printing apparatus;

Fig. 8 is a flowchart showing a control flow performed by the control system;

Fig. 9 is a view showing a relationship between
15 the specified paper size and binding margin direction and the recorded paper size, imaging position, and binding margin setting position;

Fig. 10 is a view showing a relationship between the specified paper size and binding margin
20 direction and the recorded paper size, imaging position, and binding margin setting position;

Fig. 11 is a view showing a relationship between the specified paper size and binding margin direction and the recorded paper size, imaging
25 position, and binding margin setting position;

Fig. 12 is a view showing a relationship between the specified paper size and binding margin

direction and the recorded paper size, imaging position, and binding margin setting position;

Fig. 13 is a view showing a relationship between the specified paper size and binding margin direction and the recorded paper size, imaging position, and binding margin setting position; and

Fig. 14 is a view showing a relationship between the specified paper size and binding margin direction and the recorded paper size, imaging position, and binding margin setting position.

[Description of the Reference Numerals and Signs]

- 12 CPU
- 17 Printing unit
- 19 RAM
- 15 20 External memory
- 21 Bidirectional interface
- 11 Host computer
- 1015 Operation unit
- 1000 LBP

FIG. 2

- 11 HOST COMPUTER
- 13A FONT ROM
- 13B PROGRAM ROM
- 5 13C DATA ROM
- 14 EXTERNAL MEMORY
- 16 PRINTING UNIT INTERFACE
- 17 PRINTING UNIT
- 18 INPUT UNIT
- 10 1000 PRINTER
- 1015 OPERATION UNIT

FIG. 3

START

- 15 501 VARIABLE INITIALIZATION
- 502 DATA RECEPTION
- 503 COMMAND DIVERGENCE?
- PRINTING MODE SPECIFICATION
- PAPER SIZE SPECIFICATION
- 20 CHARACTER IMAGING
- PAPER DISCHARGE
- 504 PRINTING MODE?
- BOTH-SIDES
- SINGLE-SIDE
- 25 505 SINGLE-SIDE PRINTING SETTING
- 506 BOTH-SIDES PRINTING SETTING
- 507 PAPER SIZE SETTING

- 508 CHARACTER IMAGING
- 509 PRINTING MODE?
 - BOTH-SIDES
 - SINGLE-SIDE
- 5 510 SINGLE-SIDE PRINTING
 - 511 PRINTING SURFACE?
 - SURFACE
 - BACKSIDE
 - 512 BACKSIDE PRINTING SETTING
- 10 513 PAGE LAYOUT
 - 514 TWO-PAGE PRINTING
- FIG. 4
 - SPECIFIED ITEMS
- 15 PAPER SIZE
 - BINDING DIRECTION
 - ACTUALLY IMAGING ITEMS
 - PAPER SIZE
 - IMAGING POSITION AND BINDING MARGIN POSITION
- 20 FIG. 4A
 - LEFT SIDE BINDING
 - FOLD LINE
 - SURFACE
 - BACKSIDE
- 25 BINDING MARGIN
 - FIG. 4B
 - RIGHT SIDE BINDING

FOLD LINE

BACKSIDE

SURFACE

BINDING MARGIN

5 FIG. 4C

UPPER SIDE BINDING

SURFACE

BACKSIDE

FOLD LINE

10 BINDING MARGIN

FIG. 4D

LOWER SIDE BINDING

BACKSIDE

SURFACE

15 FOLD LINE

BINDING MARGIN

FIG. 5

SPECIFIED ITEMS

20 PAPER SIZE

BINDING DIRECTION

ACTUALLY IMAGING ITEMS

PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

25 FIG. 5A

UPPER SIDE BINDING

BINDING MARGIN

SURFACE

BACKSIDE

FOLD LINE

FIG. 5B

5 LOWER SIDE BINDING

FOLD LINE

SURFACE

BACKSIDE

BINDING MARGIN

10 FIG. 5C

LEFT SIDE BINDING

BINDING MARGIN

BACKSIDE

SURFACE

15 FOLD LINE

FIG. 5D

RIGHT SIDE BINDING

FOLD LINE

BACKSIDE

20 SURFACE

BINDING MARGIN

FIG. 7

11 HOST COMPUTER

25 13A FONT ROM

13B PROGRAM ROM

13C DATA ROM

14 EXTERNAL MEMORY
16 PRINTING UNIT INTERFACE
17 PRINTING UNIT
18 INPUT UNIT
5 3000 PRINTER
1015 OPERATION UNIT

FIG. 8

START

10 901 VARIABLE INITIALIZATION
902 DATA RECEPTION
903 COMMAND DIVERGENCE?
PRINTING MODE SPECIFICATION
PAPER SIZE SPECIFICATION
15 CHARACTER IMAGING
PAPER DISCHARGE
904 PRINTING MODE?
BOTH-SIDES
SINGLE-SIDE
20 905 SINGLE-SIDE PRINTING SETTING
906 BOTH-SIDES PRINTING SETTING
907 PAPER SIZE SETTING
908 CHARACTER IMAGING
909 PRINTING MODE?
25 BOTH-SIDES
SINGLE-SIDE
910 PAPER SIZE?

- SAME MAGNIFICATION
- DOUBLE
- 911 SINGLE-SIDE PRINTING
- 912 PRINTING SURFACE?
- 5 FIRST PAGE
- SECOND PAGE
- 913 PRINTING SURFACE UPDATE
- 914 PAGE LAYOUT
- 915 TWO-PAGE PRINTING
- 10 916 PRINTING SURFACE?
- FIRST AND THIRD PAGES
- FOURTH PAGE
- SECOND PAGE
- 917 PRINTING SURFACE UPDATE
- 15 918 PAPER SIZE?
- SAME MAGNIFICATION
- DOUBLE
- 919 TWO-PAGE PRINTING
- 920 PRINTING SURFACE UPDATE
- 20 921 FOUR-PAGE PRINTING

FIG. 9

- SPECIFIED ITEMS
- PAPER SIZE
- 25 BINDING DIRECTION
- ACTUALLY IMAGING ITEMS
- PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

FIG. 9A

LEFT SIDE BINDING

SURFACE

5 TEAR-OFF LINE

BINDING MARGIN

BACKSIDE

TEAR-OFF LINE

BINDING MARGIN

10 FIG. 9B

RIGHT SIDE BINDING

SURFACE

TEAR-OFF LINE

BINDING MARGIN

15 BACKSIDE

TEAR-OFF LINE

BINDING MARGIN

FIG. 10

20 SPECIFIED ITEMS

PAPER SIZE

BINDING DIRECTION

ACTUALLY IMAGING ITEMS

PAPER SIZE

25 IMAGING POSITION AND BINDING MARGIN POSITION

FIG. 10A

UPPER SIDE BINDING

SURFACE

TEAR-OFF LINE

BINDING MARGIN

BACKSIDE

5 TEAR-OFF LINE

BINDING MARGIN

FIG. 10B

LOWER SIDE BINDING

SURFACE

10 TEAR-OFF LINE

BINDING MARGIN

BACKSIDE

TEAR-OFF LINE

BINDING MARGIN

15

FIG. 11

SPECIFIED ITEMS

PAPER SIZE

BINDING DIRECTION

20 ACTUALLY IMAGING ITEMS

PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

FIG. 11A

UPPER SIDE BINDING

25 SURFACE

BINDING MARGIN

TEAR-OFF LINE

BACKSIDE

BINDING MARGIN

TEAR-OFF LINE

FIG. 11B

5 LOWER SIDE BINDING

SURFACE

TEAR-OFF LINE

BINDING MARGIN

BACKSIDE

10 TEAR-OFF LINE

BINDING MARGIN

FIG. 12

SPECIFIED ITEMS

15 PAPER SIZE

BINDING DIRECTION

ACTUALLY IMAGING ITEMS

PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

20 FIG. 12A

LEFT SIDE BINDING

SURFACE

BINDING MARGIN

FOLD LINE

25 BACKSIDE

FOLD LINE

BINDING MARGIN

FIG. 12B

RIGHT SIDE BINDING

SURFACE

FOLD LINE

5 BINDING MARGIN

BACKSIDE

BINDING MARGIN

FOLD LINE

10 FIG. 13

SPECIFIED ITEMS

PAPER SIZE

BINDING DIRECTION

ACTUALLY IMAGING ITEMS

15 PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

FIG. 13A

LEFT SIDE BINDING

SURFACE

20 FOLD LINE

BINDING MARGIN

BACKSIDE

FOLD LINE

BINDING MARGIN

25 FIG. 13B

RIGHT SIDE BINDING

SURFACE

FOLD LINE

BINDING MARGIN

BACKSIDE

FOLD LINE

5 BINDING MARGIN

FIG. 14

SPECIFIED ITEMS

PAPER SIZE

10 BINDING DIRECTION

ACTUALLY IMAGING ITEMS

PAPER SIZE

IMAGING POSITION AND BINDING MARGIN POSITION

FIG. 14A

15 UPPER SIDE BINDING

SURFACE

FOLD LINE

BINDING MARGIN

BACKSIDE

20 FOLD LINE

BINDING MARGIN

FIG. 14B

LOWER SIDE BINDING

SURFACE

25 FOLD LINE

BINDING MARGIN

BACKSIDE

FOLD LINE

BINDING MARGIN